

What is claimed is:

1. A pinned photodiode for a CMOS image sensor comprising:
a first potential well formed between a substrate and a photodiode; and
a second potential well having a center-cross form across said photodiode,
the second potential well being positioned more deeply than said first
potential well, so that excess electrons generated by light in said first
potential well can move easily to said neighboring second potential well.
2. A pinned photodiode as defined by claim 1, wherein said substrate is a P type
or an N type.
3. A pinned photodiode as defined by claim 1, wherein said first potential well is
a P+ potential well or an N+ potential well.
4. A pinned photodiode as defined by claim 1, wherein said second potential well
is a P+ potential well or an N+ potential well.
5. A pinned photodiode as defined by claim 1, wherein said second potential well
is electrically connected with a drive transistor.
6. A method of making a pinned photodiode for a CMOS image sensor,
comprising the steps of:
forming a photodiode on a substrate;
forming a first potential well between said substrate and said photodiode; and
forming a second potential well having a center-cross form across said
photodiode, the second potential well being positioned more deeply than
said first potential well, so that excess electrons generated by light in
said first potential well can move easily to said neighboring second
potential well.
7. A method as defined by claim 6, wherein said substrate is a P type or an N
type.
8. A method as defined by claim 6, wherein said first potential well is a P+
potential well or an N+ potential well.
9. A method as defined by claim 6, wherein said second potential well is a P+
potential well or an N+ potential well.

10. A method as defined by claim 6, wherein said first potential well and said second potential well are formed by means of ion implantation or thermal diffusion.
11. A CMOS image sensor comprising:
 - a plurality of said pinned photodiodes comprising:
 - a first potential well formed between a substrate and a photodiode; and
 - a second potential well having a center-cross form across said photodiode, the second potential well being positioned more deeply than said first potential well, so that excess electrons generated by light in said first potential well can move easily to said neighboring second potential well; and
 - a plurality of transistors.
12. A CMOS image sensor as defined by claim 11, further comprising a drive transistor, a reset transistor, and a select transistor.